Einstein’s Revolutionary Ideas in Physics

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With financial assistance from the Institute of Physics, we have prepared a one-hour talk about Einstein’s life and times, and particularly his three great revolutionary ideas of 1905: the explanation of Brownian Motion, of the Photo-Electric effect, and Special Relativity. This was originally created for Einstein Year (2005) and we have since given the talk to schools and other audiences more than 100 times, all over England, and even in France and Australia! The lecture is usually delivered jointly, but either of us can give it alone if necessary.

If you would like to host the talk, or would be prepared to bring a party of students to hear it at a nearby venue, please let us know. The talk can either be given to a group of year 12 and 13, or in a ‘lighter’ version to students from year 11, or even to a parents’ evening. The talk is not just about Physics, but includes some of the history of Einstein’s life and times. There is no charge for the talk, but we hope you will be able to reimburse our (modest) travel expenses.

It may be possible in some cases, to combine this talk with a demonstration lecture to younger students: a “Liquid Nitrogen Show”, including ‘instant’ ice cream. Please let us know if you are interested in this. Further information is available from vincent.smith@bristol.ac.uk, who can also offer (free!) talks from the list below:

1) “How the Higgs Boson was Discovered” (Alternative title: “How I discovered the Higgs Boson, with the help of 7,000 colleagues!”) Why we need the Higgs boson, to complete the Standard Model of Particle Physics (the Standard Model is described for the uninitiated!) and how the experiments at CERN’s Large Hadron Collider have recently produced preliminary evidence for what is probably the Higgs boson. Suitable for school students in years 12 and 13, or first-year undergraduates. A version is also available for public audiences.

2) “Wave-Particle Duality: is the electron there when you are not looking?” An introduction to the physics of waves and of particles, and how both descriptions are needed for the quantum world. Includes a number of simple demonstrations. Suitable for school students from year 11 upwards.

3) “Relativity and the Twin Paradox” A simple ‘demonstration’, with audience participation, of a prediction of Special Relativity, namely that a twin who travels away from Earth and returns, will age more slowly then one who stays at home! Suitable for school students from year 11 upwards and public audiences.

4) “What Time is it on Mars?”
The history of timekeeping on Earth before atomic clocks, and some minor problems with this. We then look at how our timekeeping will have to change when we travel to the planets. Suitable for school students from year 9 upwards (also suitable for parents’ evenings and public audiences.)

NB I can also give this lecture in French: "Quelle heure est-il sur les planètes?"

5) “How Does the Sun Work?”
An introduction to the reactions that keep the Sun shining, and how we can measure them on Earth. Suitable for school students from year 11 upwards, also public audiences.

6) Fun with liquid nitrogen (can include ice cream.)
This lecture needs a supply of liquid nitrogen, so it can be done within car travel of the University, or by arrangement with a local supply of liquid nitrogen, eg a hospital. The lecture has plenty of demonstrations, and optionally can finish by making instant ice cream for all participants (approx 35p each for ingredients!) Suitable for all ages: Primary/Secondary/Parents’ evenings, public audiences.

7) Fun with magnets
Audience participation to explore the properties of magnets and magnetic materials. Suitable for Primary school students.